

**IAEA/ANL
Interregional Training Course**



**Technical and Administrative Preparations
Required for Shipment of Research Reactor
Spent Fuel to Its Country of Origin**

Argonne National Laboratory
Argonne, IL
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Lecture L.4.1

Cask Selection

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Cask Selection

IAEA/USA Inter-Regional Training Course

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Cask Selection Considerations

- Compatibility with Fuel Assemblies
- Compatibility with Facility
- Availability of Cask
- Personal Preference

Compatibility with Fuel Assemblies

- Physical Dimensions, i.e., will Assemblies Fit in the Basket?
- Fissile Content - Grams of U235, Grams of U, Enrichment
- Cool Down Time Requirements
- Decay Heat Load
- Activity and Dose Rates

Compatibility with Facility

- Crane Capacity
- Maximum and Minimum Crane Hook Height
- Allowable Floor Loading and Spent Fuel Pool Depth
- Physical Size of Doorways
- Clearances for Handling the Cask in the Building, Spent Fuel Storage Pool, and/or Hot Cell

Current Cask Inventory

Cask	Owner	Available to Ship MTR	Available to Ship TRIGA	Number Available
TN7/2	NCS	Currently	No	2
GNS-11	NCS	Currently	No	2
IU-04	TN	Currently	Limited	5
LHRL 120	ANSTO	Certifiable	No	1
TN 6-1, 6-3	NCS	Certifiable	Pending	1 Each
GE 2000	GE	Currently	Pending	2
NAC-LWT	NAC	Currently	Pending	5
Transfer System	NAC	Currently	Pending	1

Future Casks Planned

Cask	Owner	Available to Ship MTR	Available to Ship TRIGA	Number Available
GNS (New)	NCS	1997	1997	2
TN (New)	TN	1998	1998	2
NL-1/2	NAC	NRU, NRX Only	No	5
Transfer System	NCS	1997	1997	1

GNS-11

<u><i>Aluminum MTR Elements</i></u>	<u><i>LEU</i></u>	<u><i>HEU</i></u>
Maximum Number of Elements	33	33
Maximum Enrichment	20%	94%
Maximum U	1635 g	335 g
Maximum U235	323 g	268 g
Maximum Decay Heat Load	48.5 W	48.5 W
Minimum Cooldown Time	360 Days	1808 Days
Maximum Activity	1 Pbq	1 Pbq

TRIGA

Not Currently Certified for TRIGA Fuel

TN 7/2

Aluminum MTR Elements

Maximum Number of Elements	64
Maximum Enrichment	80-93
Maximum U	363 g
Maximum U235	290 g
Maximum Decay Heat Load	125 W
Minimum Cooling Time	170 Days
Maximum Activity	740 Tbq

TRIGA

Not Currently Certified for TRIGA Fuel

NAC-LWT

Aluminum MTR Elements

HEU

LEU

Maximum Number of Elements

42 (Cropped)
28(Uncropped)

42 (Cropped)
28 (Uncropped)

Maximum Enrichment

80-94%

20%

Maximum U

377 g

1722 g

Maximum Decay Heat Load

30 w/Element

24 w/Element

Minimum Cooling Time

3 Years

1 Year

Maximum Ave. Burnup

550,000 MWD/MTU

90,490 MWD/MTU

TRIGA

Not Currently Certified for TRIGA Fuel - Certification is
Planned During 1997

IU-04

Aluminum MTR Elements

Maximum Number of Elements	36 in Basket TN 9083 40 in Basket AA 267
Maximum Enrichment	100%
Maximum U235 Concentration	0.73 g/cm
Maximum Decay Heat Load	<132 w/Element (TN 9083) <80 w/Element (AA 267)
Minimal Fuel Core Thickness	0.5 mm
Minimal Cladding Thickness	0.2 mm

IU-04 (Cont'd)

TRIGA

Maximum Number of Elements	Any number that can be placed in basket TN 9083, tight or not (144?)
Cladding	Aluminum
Composition	
Uranium	8%
Zirconium Hydride	92%
Maximal Contents	
Uranium Weight	<199 g/Element
Uranium Enrichment	20%

GE 2000

<u>Aluminum MTR Elements</u>	<u>HEU</u>	<u>LEU</u>
Maximum Number of Elements	42 (Cropped) 21 (Uncropped)	42 (Cropped) 21 (Uncropped)
Maximum Enrichment	93.2%	20%
Maximum U235	355 g	355 g
Maximum Burnup	533 GWd/MTU	100 GWd/MTU
Maximum Decay Heat Load	35 W	35 W
Maximum Cooling Time	880 Days	880 Days

TRIGA

Not Currently Certified for TRIGA Fuel - Application has been Submitted for Certification of up to 84 TRIGA Elements, Enriched Between 20% and 93%, with Aluminum, Inconel, or Stainless Steel Cladding

IU-04 in Port Ready For Loading





IU-04 After Fuel Loading



NAC-LWT After Fuel Loading

NAC-LWT Transfer Cask

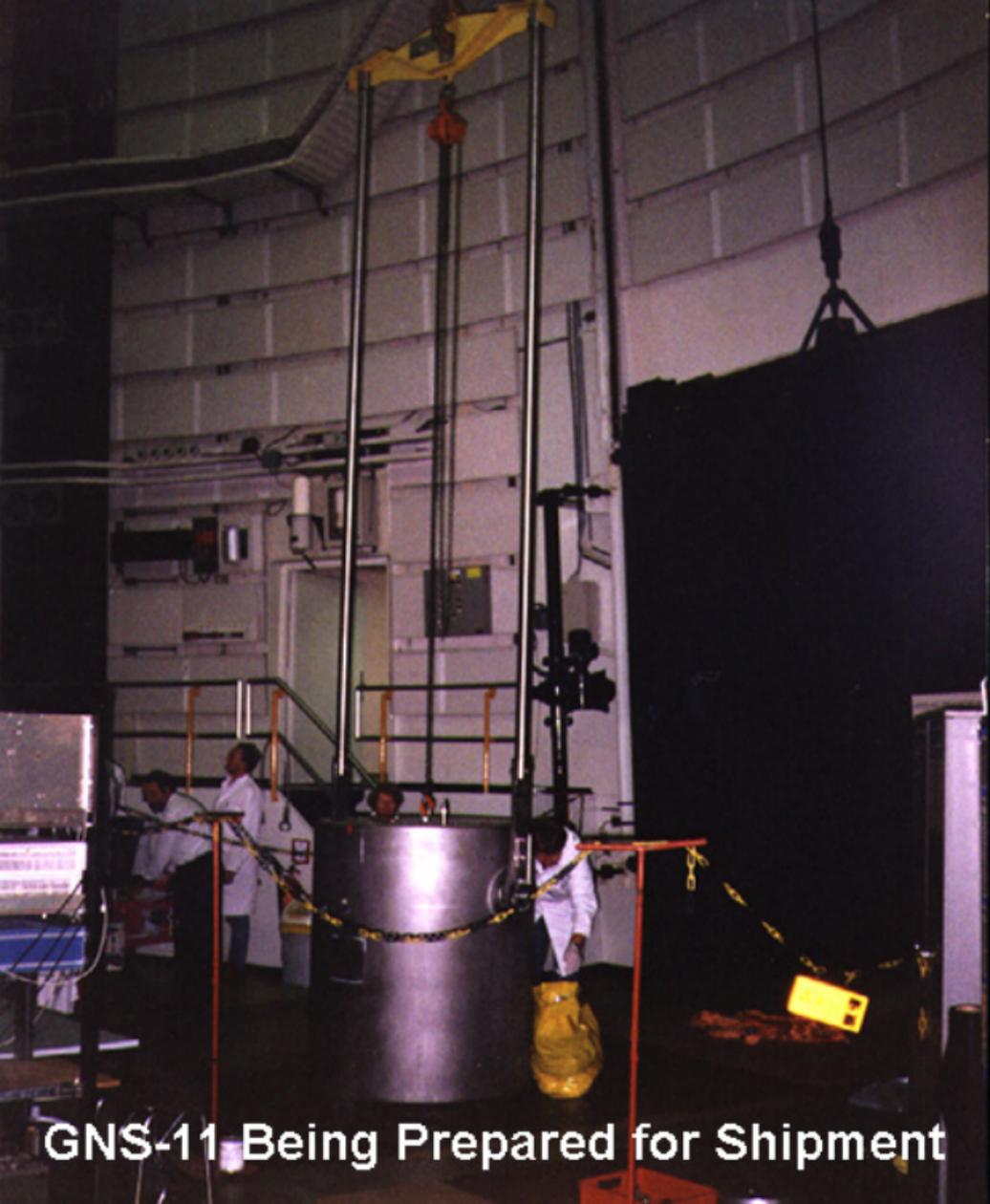


TN-7 Being Lowered into Fuel Storage Pool





**GNS-11
Being Loaded
with SNF**



GNS-11 Being Prepared for Shipment

RBOF Receiving Facility for Aluminum MTR Fuel





**Savannah River Site
Receiving Site for Aluminum MTR Fuel**